

ULTRASHORT PULSE AMPLIFICATION IN CRYOGENICALLY COOLED AMPLIFIERS

ABSTRACT OF THE INVENTION

A laser amplifier system amplifies pulses in a single “stage” from $\sim 10^{-9}$ joules to more than 10^{-3} joules, with average power of 1-10 watts, and beam quality $M^2 < 2$. The laser medium is cooled substantially below room temperature, as a means to improve the optical and thermal characteristics of the medium. This is done with the medium inside a sealed, evacuated or purged cell to avoid moisture or other materials condensing on the surface. A “seed” pulse from a separate laser is passed through the laser medium, one or more times, in any of a variety of configurations including single-pass, multiple-pass, and regenerative amplifier configurations.